

SCIENCE

NEW YORK, AUGUST 12, 1892.

THE CHIEF MOUNTAIN LAKES.

BY GEORGE BIRD GRINNELL.

IN Volume I., Pacific Railroad Reports, pp. 548-549, Mr. James Doty speaks of visiting the Chief Mountain Lake, and describes it and its companion sheet of water. The maps of that survey and other more recent ones show lakes to which this name is given, and references in some recent literature apply to the lakes shown on those maps.

The lakes so named are, however, not the ones mentioned by Mr. Doty, but lie about 25 or 30 miles to the north and west of those which he visited, and it would appear that since Mr. Doty's time no geographer has recognized the lakes which he saw and which he speaks of as "the well-known Chief Mountain Lake." Those called by this name on government maps and referred to in reports of the international boundary survey, published in 1876, are locally known as Kutenai Lakes, but, of course, are not to be confounded with the true Kutenai lakes lying on the Pacific slope and in the bend of the Columbia River. The so-called Kutenai, or Little Kutenai, lakes are crossed by the international boundary line and form the sources of the Little Kutenai or Waterton River, and it is probable should be known as the Waterton Lakes. Chief Mountain is a well-known landmark of north-western Montana, but the Chief Mountain Lakes are unknown in that country, and the lakes mentioned by Mr. Doty are locally known as the St. Mary's Lakes, while the large river flowing from them is called St. Mary's River. It is the most important stream meeting Belly River from the south. The town of Lethbridge, in Alberta, N. W. T., stands at the junction of these two rivers.

Mr. Doty's description of his route, of the country, and of Chief Mountain Lake is very clear, and anyone who is familiar with the region traversed will at once recognize that the lakes on St. Mary's River are Chief Mountain Lakes.

For a number of years I have been in the habit of visiting the region in question, which has been practically unknown even to hunters and trappers, and have explored a section embracing perhaps 900 square miles.

I quote from Mr. Doty's narrative of his journey from Two Medicine Lodge Creek to the Chief Mountain Lakes. Under date of May 27 he says: "The country is considerably broken by high hills and narrow valleys of spring brooks, filled with thickets of poplar and willow and flooded by beaver dams. In twelve miles came to a fine stream [now known as Willow Creek] which is a branch of Cut Bank River; and in sixteen miles reached the Cut Bank itself, the most northerly fork of Marias River. It is a rapid stream, fifty feet wide, and flows through a rich valley. . . . A broad lodge-trail leads up the valley indicating that the pass is considerably used — probably by the Pend d' Oreilles and Kootenai who come through to hunt buffalo. Crossed at a good ford; pushed on over a range of high hills and encamped on a small stream eight miles from Cut Bank River, which is no doubt one of the sources of Milk River. . . .

"May 28. Morning cold, and the hills are white with snow. The country is quite flat and full of springs and spring brooks, which are the sources of Milk River. On our left is a heavy forest of pine timber fifteen miles in length and extending into the plain eight miles from the base of the mountains. Immediately after passing the point we obtained a view of the chief (*sic*) of King Mountain, which is a bare rocky peak of a square form, standing at a distance of five or six miles from the main chain, and connected with it by a high ridge wooded with pine. In seventeen miles came to a broad valley, the sides of which are wooded with pine and poplar; and in the bottom, five hundred feet below us, we saw the blue water of a mountain lake. This is the well-known Chief Mountain Lake. It takes its name from Chief Mountain. . . . Descending into the valley, in four miles, we reached the lake and encamped in a beautiful prairie bordering it.

"May 29. Moved up the lake three miles to its inlet and encamped. In this camp we remained until June 5th. . . .

"Chief Mountain Lake is seven miles long by one broad. Its banks are low and shore gravelly; the water clear and very deep. The valley of the lake is six miles in breadth, and is rolling prairie interspersed with groves of cottonwood and poplar, and in the low places the birch and willow. The soil is a reddish loam and is fertile, as is indicated by the luxurious vegetation. Pine of a fair size and thrifty growth is abundant and can easily be obtained, and there are inexhaustible quarries of good limestone.

"Connected with Chief Mountain Lake is another three-fourths of a mile wide and extending some nine miles into the mountains in the form of a bow, and I therefore called it 'Bow Lake.' It is shut in by mountains coming close down to the water, and has no valley susceptible of cultivation.

"The mean of observations for latitude gives as the latitude of this, the south end, of Chief Mountain Lake $48^{\circ} 43' 09''$, or 17 miles south of the boundary line. . . .

Numerous little streams emptying into these lakes are filled with beaver dams and beaver, this industrious animal having been left in quiet possession of this country since the low price of its fur has rendered it unprofitable to trap them. Elk, moose, and deer are abundant, and salmon trout of large size are taken in the lakes.

"June 5. Started due north along the lake-shore, and in seven miles came to the outlet at the extreme northern end. The outlet is called in the Blackfoot language *Mo-ko un* or Belly River. It is a swift, deep stream where it comes from the lake and about 80 feet wide, and its course for some miles is due north. This is the most southerly of the head-waters of the Saskatchewan River."

This excellent description of the country makes it clear to my mind that the name Chief Mountain Lakes belongs to those lakes, in north-western Montana, which are locally known as the St. Mary's Lakes. This name was given them nearly fifty years ago by Hugh Munroe, an old Hudson's Bay man, and Mr. Doty's companion on the occasion of his visit to the lakes.

It would seem from Mr. Doty's description that the stream

which we know as St. Mary's River is the true Belly River. This seems natural and proper, for at the point where they meet, the St. Mary's is a larger stream than Belly River.

As stated by Mr. Doty these lakes are two in number, the lower about seven miles long by a mile wide, the upper perhaps eleven miles long and nowhere more than a mile in width. The lower lake lies north and south, and the upper, Mr. Doty's Bow Lake, is bent about half-way up its length, its upper or south-western half lying nearly east and west, and its lower or northern half nearly north and south. Beyond the head of this upper lake is the narrow river-valley running back in two principal branches for a dozen miles and heading on the Continental Divide. The southernmost of the two branches is much the larger of the two, and is fed by extensive glaciers, which I have visited.

The lower end of the lower lake is not more than seven or eight miles from the Chief Mountain, the most striking landmark in this region. The waters flowing into the St. Mary's River are divided from those which flow into Cut Bank and Milk Rivers, tributaries of the Missouri, by a high ridge running out from the Rocky Mountains, and known as Milk River Ridge.

BIRDS BREEDING AT HANOVER, NEW HAMPSHIRE.

BY CLARENCE M. WEED.

THE village of Hanover, N.H., is in the region dividing the Canadian and Alleghanian faunas, and possesses many animal forms from both. To assist in determining more definitely the precise limits of these faunas, the Ornithological Club of the New Hampshire College undertook last spring to record the birds breeding within five miles of Hanover. The following list includes the species observed this season by the members of the club. Especial mention should be made of the assistance rendered by Messrs. P. L. Barker, R. A. Campbell, and C. E. Hewitt.

Green Heron, *Ardea virescens*. One nest observed.

American Woodcock, *Philohela minor*. Three nests observed.

Ruffed Grouse, *Bonasa umbellus*. Three nests observed.

Cooper's Hawk, *Accipiter cooperi*. One nest observed.

Acadian Owl, *Nyctala acadica*. One nest observed.

Black-billed Cuckoo, *Coccyzus erythrophthalmus*. One nest observed.

Belted Kingfisher, *Ceryle alcyon*. Two nests observed.

Downy Woodpecker, *Picus pubescens*. One nest observed.

Golden-winged Woodpecker, *Colaptes auratus*. Two nests observed.

Night Hawk, *Chordeiles virginianus*. One nest found fifteen miles south-east of Hanover; and others reported by outsiders within three miles of the village.

Chimney Swallow, *Chaetura pelagica*. Many nests.

Ruby-throated Humming-Bird, *Trochilus colubris*. One nest.

Kingbird, *Tyrannus tyrannus*. One nest.

Pewee, *Sayornis phoebe*. Many nests.

Traill's Flycatcher, *Empidonax pusillus*, var. *trailli*. One nest.

Least Flycatcher, *Empidonax minimus*. One nest seen at Grafton Centre, N.H., fifteen miles south-east.

Blue Jay, *Cyanocitta cristata*. One nest at Fairlee, Vt., eighteen miles north.

Crow, *Corvus americanus*. Two nests.

Bobolink, *Dolichonyx oryzivorus*. One nest.

Cowbird, *Molothrus ater*. Three eggs found in a bobolink's nest.

Red-winged Blackbird, *Agelaius phoeniceus*. Two nests.

Baltimore Oriole, *Icterus galbula*. Several nests.

Red Crossbill, *Laxia curvirostra*. In 1891 a very young specimen was brought me that apparently must have been raised in this vicinity.

Yellowbird, *Spinus tristis*. Two nests.

Purple Finch, *Carpodacus purpureus*. One nest.

Bay-winged Bunting, *Poocetes gramineus*. Several nests.

English Sparrow, *Passer domesticus*. Several nests.

Savanna Sparrow, *Ammodramus sandwichensis*, var. *savanna*. One nest.

Chipping Sparrow, *Spizella socialis*. Several nests.

Song Sparrow, *Melospiza fasciata*. Several nests.

Swamp Sparrow, *M. georgiana*. One nest.

Snow Bird, *Junco hyemalis*. One nest observed at Grafton Centre, N.H., fifteen miles south-east.

Indigo Bird, *Passerina cyanea*. Two nests seen in 1891.

Barn Swallow, *Chelidon erythrozaster*. One nest observed.

Purple Martin, *Progne subis*. One nest.

Bank Swallow, *Clivicola riparia*. Two nests.

Cedar Bird, *Ampelis cedrorum*. Two nests.

Great Northern Shrike, *Lanius borealis*. Two nests.

Red-eyed Vireo, *Vireo olivaceus*. One nest.

Yellow Warbler, *Dendroica aestiva*. One nest.

Chestnut-sided Warbler, *Dendroica Pennsylvanica*. One nest.

American Redstart, *Setophaga ruticilla*. One nest.

Oven-bird, *Seiurus aurocapillus*. One nest.

Catbird, *Galeoscoptes carolinensis*. Two nests.

Brown Thrush, *Harporhynchus rufus*. One nest.

House Wren, *Troglodytes aedon*. One nest.

Short-billed Marsh Wren, *Cistothorus stellaris*. A nest supposed to be of this species is reported.

Chickadee, *Parus atricapillus*. Two nests.

Tawny Thrush, *Turdus fuscescens*. Three nests.

Hermit Thrush, *T. pallasi*. Two nests.

Robin, *Merula migratoria*. Several nests.

Blue Bird, *Sialia sialis*. Several nests.

Of course this list includes only a portion of the birds breeding here, but it may serve as a basis for future observations.

New Hampshire College.

HOT WEATHER IN MARS.

BY PROFESSOR EDWIN J. HOUSTON.

THE recent severe, protracted, hot weather, that existed in the central and eastern portions of the United States during the latter part of July, formed, in all probability, but part of various general phenomena produced by profound solar disturbances.

So many of the earth's natural phenomena find their origin in the solar radiation, that it is impossible to vary either the amount or the distribution of the solar energy without markedly modifying terrestrial phenomena. Such influences, however, are not limited to terrestrial phenomena; they must extend beyond the earth and be shared by all the members of the solar system.

Natural phenomena form but links in endless chains of cause and effect. An evolution or expenditure of energy, such, for example, as that following a sun spot, produces a number of allied phenomena which are themselves the causes of subsequent phenomena, and these in turn the causes of still other phenomena, the chain extending in most instances far beyond our ken.

There has been unusual solar activity during 1892, as has been evidenced by an unusual number of sun spots. The great spot observed in Philadelphia and elsewhere in the early part of the year was one of the largest ever studied, and since that time numerous other abnormally large spots have appeared.

It would seem that these rather unusual outbursts of solar energy have produced the following terrestrial phenomena, viz. :—

- (1.) The recent brilliant auroral displays.
- (2.) Magnetic storms, or marked disturbances in the values of the magnetic intensity, in inclination and declination.
- (3.) Unusually severe electric storms, as evidenced by the existence of abnormal earth currents. These electric storms are in reality connected with the magnetic storms.
- (4.) Marked disturbances in the earth's meteorological phenomena. These have been evidenced by the long spells of unseasonable weather that have occurred so frequently in the United States during 1892, one of which was the recent unusually hot weather before alluded to, the unusual severity of which accords well with the unusual solar activity.

So, too, does the severity of the allied phenomena. Take, for example, the auroral displays, which have seldom been equalled in these latitudes for brilliancy. So also the electric storms and magnetic storms, which have been unusually severe during 1892. According to the observations of Mr. Finn and others, as many as eleven such storms were recorded during this time. Their dates were as follows: February 13, March 6, March 12, April 24, April 25, April 26, May 16, May 17, May 18, July 12, and July 16.

The storm of July 16 was unusually severe, and caused great disturbances on the various telegraph lines. The earth-currents were so strong that the lines could be operated entirely by means of earth-currents. This was done, for example, in the case of one of the lines between New York and Boston. On the same day, July 16, an enormous spot appeared on the sun.

And now for possible extra-terrestrial influences and phenomena. The recent opposition of Mars has brought that planet nearer the earth than she has been at any time since 1877, and nearer than she will ever be again until 1909. The opportunity has therefore been particularly good for studying those peculiarities of the surface that have always been of such interest to astronomers.

Some observations recently made on Mount Hamilton appear to show a marked decrease in the mass of snow within the polar caps, as is inferred from certain characteristic markings at these points of the planet. This disappearance is unusual, and would seem to indicate unusually hot weather in our sister planet. The Martian thermometer has probably been way up, and the weather has, to form a phrase from the fiery color of the planet, been at a red-heat.

We may add, therefore, another effect produced by the unusual sun-spot, viz., 5. The extra-terrestrial effects.

Of course the influence may be mutual. It may be that the unusual proximity of Mars may be the cause of the great number of spots, in which case we may thank Mars for the recent terrific heat.

"FLATHEAD" DEER.

IN the *American Naturalist* for August, 1887, were given some instances of the occurrence among deer of hornless specimens. Here we shall summarize these, preparatory to giving in full some original particulars furnished us by a German correspondent.

Lord Lovat is quoted as having seen *humle* (hornless) stags. They are able to thrash stags of their own or greater than their own weight. Several of them were undisputed masters of large herds.

Mr. Horatio Ross has also shot them. They are more frequent than generally supposed. They are no whit inferior to their horned brethren. A full-grown *humle* is very formidable in fight. During the rutting season Mr. Ross has seen one in possession of a large herd of hinds, who drove off all rivals.

Both these gentlemen's experience refers to Scotland. The following mentioned special cases refer to Germany. H. von Nathusius of Altaldensleben, Saxony, and Ludwig Beckman have supplied very interesting information which is well worth reading to those interested in venery.

These hornless deer occur wild, they write, and are very fertile and impressive. In the *Illustrierte Zeitung*, published in Leipzig (Oct. 2, 1886), there is a picture of a fight between a horned and a hornless stag, in which the hornless stag displays the mastery. Hornless stags have been mentioned in German sporting literature since the seventeenth century.

These are cases of what is regarded as variation, but which really appear to be referable to atavism, as will be immediately seen.

There are two species of deer that are normally destitute of horns as a characteristic. The first of these is the musk-deer; these have peculiarly long canine teeth. These (*Moschus moschiferous*) are natives of Thibet and Nepaul. The second is the water-deer, *Hydropetes inermis*. It is found in the marshes of the Yangtze, above Chin-kiang, China. The Chinese are strongly averse to the flesh, which Europeans, for want of better, pronounce tolerable.

Passing from living to extinct forms of deer, we find that, tracing them backwards, they become more and more simple as to horns, till reaching the lower miocene no member of the family is possessed of antlers. It will thus be admitted that the claim that instances of hornless deer of the present time are only cases of atavism, or reversion to the early condition of the head of the species, is simply the truth. Further, the above facts prove that horns are of the nature of acquired characters—a rather interesting fact just now to bring out in connection with the Wiesmannia that is raging.

The following is a translation of the communication we received from our German correspondent:—

"The hunter of the deer species has for long designated the deer which are destitute of antlers by the name of 'flat-heads,' or *mænche*. On the skull of such deer appears a so-called *hornbase*, usually the real bearers of the antlers, remarkably stunted and entirely overgrown with the elongated hair of the forehead. The cause of such striking appearance is often held to be the long-continued inbreeding occurring in certain districts, or the lack of new blood obtained by bringing in deer not related.

"If we notice how the deer and roebucks which have been confined for domestication and freely fed with oats, rye, peas, corn, acorns, chestnuts, and beechnuts, often develop uncommonly large and branching antlers, it seems just to conclude that a lack of these and other means of nourishment hinders the growing of horns. In fact the so-called

'flatheads' are more particularly found in the pine-wood regions, where game is obliged to subsist solely upon heather forage (sweet broom), and where food is to be found only in occasional places.

"As transitory forms, there are also in such districts, in addition to the few flatheads found at all times, deer having one 'scurr' or stunted horn, while the other horn is well developed, bearing perhaps ten to twelve branches, and the majority of the rest of the deer have only small, smooth antlers of light color, some curiously bent or spirally twisted. Deer which instead of antlers bear a long, straight, spear-like horn on one side were formerly called 'provincial murderers,' as they were considered a very dangerous enemy of other deer during the rutting season, and on which account their destruction was sought.

"In the main, these so-called deformities, and even the total absence of antlers on the flatheads, can in no way be considered an indication of the lack of procreative power, nor can they be classed with the abnormal forms or the total loss of antlers, which results from injuries, and which reappear in their young. The flathead deer are seldom unequal in strength or weight to the others of the same age and the same district, but occasionally excel the latter in these respects. They also early enter the rutting season, and show themselves equally ready for the conflict. Their art and manner of fighting are singular enough; like the female, they rise up high on their hind feet, and with their fore-feet they, from above, mercilessly strike their antagonist. It is remarkable how the antler-bearing antagonist intuitively enters such conflict by rising on his hind feet, making no use of his terrible weapons. On such occasions the flathead, having developed superior skill in his movements, almost always puts to flight in a few rounds much larger deer with immense forked horns. Also at other seasons the contests may be observed in regions where the flatheads are found, and where at times a troop of such game is run together into a narrow space, as is the case occasionally during the preparations of a suspended hunt; yet those encounters are less fierce and soon ended, as they are brought on by the momentary invitations and accidental meeting of the deer in the press."

Have there been any cases of deer, bisons, etc., with 'flat' or hornless heads noticed in America? A.

SOME ANALOGIES BETWEEN MOLECULES AND CRYSTALS.

BY JOHN W. CALDWELL.

CHEMISTRY and crystallography are closely related branches; they are, indeed, but parts of one great whole. The special design of chemical laws is to present the methods and conditions of the re-arrangement of atoms, which re-arrangements we generally denominate chemical reactions. The laws of crystallography, on the other hand, primarily relate to the element of form. While the first series of laws concerns the arrangements of atoms, the second takes cognizance of the arrangements of molecules: while the one considers the influence of the chemical force of affinity, the other is concerned with the physical force of crystallization.

A consideration and comparison of the most important laws of the two series will develop, I think, a most interesting parallelism and correspondence. Thus, the first great law of chemistry is that of definite proportions, in which is stated the principle of the fixed and unchanging composition of

every compound. It finds its satisfactory analogue in the crystallographic law of the constancy of the interfacial angles, first propounded by Steno in 1669, and re-enunciated by Romé de l'Isle in 1783. It affirms that for a certain crystal species, under conditions of absolute identity of chemical constitution and equality of temperature, the corresponding interfacial angles in different individuals will be found always to be equal and constant; and this holds in imperfect as well as perfect crystals. It is evident then, that what the law of definite proportions is, in regard to chemical constitution, the law of constancy of the interfacial angles is, in respect to crystalline form.

Another equally perfect and beautiful correspondence obtains between the law of multiple proportions and that of the rationality of the indices. The former emphasizes the simple multiple ratio of one element as it unites with some other element to form two or more compounds; whereas the latter, an important crystallographic law, attributed to Haüy, articulates the remarkable fact that the modifications of specific crystalline form always take place by a multiplication of one or more of the index values (or the reciprocals of these, the parameter values), by small and simple numbers or fractions, by rational and not by irrational quantities. The analogy here existing is easily appreciated: in the one case we have presented the method (namely, by simple multiple ratio) of the formation by weight of chemical compounds containing the same elements; in the other, the method, also by simple multiple ratio, by which is determined the modification of fundamental form of a crystalline species.

A third analogy is found in the comparison of the law of valency or equivalence in the chemical domain, and the law of replacement or substitution in the crystallographic. The first of these, of course, refers to the relation by weight in which the various elements react; potassium being exchanged for sodium in the proportion of 39 of the former to 23 of the latter; and, in like manner, chlorine (35.5) for bromine (80). The chemical type or idea is continued in such reactions, although one of the original constituents may have been substituted by another element. Correspondingly, the law of replacement allows the crystallographic type or idea to be continued, though by altered agents. Thus, the recognized substitution-power of magnesium and calcium allows, in compounds of the latter, a greater or less substitution of the former, without change of crystalline form; calcite and dolomite are both rhombohedral in crystallization, the angles of the two differing slightly.

A fourth analogy is expressed in the allotropisms and isomerisms of chemistry, and the dimorphisms and polymorphisms of crystallography. The allotropism of elements is probably to be explained upon the basis of different atomicities of the elemental molecule; but, however explained, like atoms are able in many cases to build up structures sometimes as variant in physical characters as are the diamond and ordinary charcoal, having chemical dispositions as different as common phosphorus and red phosphorus. Similar suggestions apply to the subject of isomerism. Now, to this, crystallography presents an analogue in the dimorphism so often to be seen in minerals; one and the same substance showing itself in nature in two (sometimes more) crystalline forms, i.e., belonging to distinct crystalline systems; take, as illustration, calcite (rhombohedral) and aragonite (orthorhombic). Here again diversity of form is set over against diversity of physical and chemical characters.

A fifth analogy (the last that I shall venture) bases upon

the hypothecation of actual molecular structural form — configuration, according to Wunderlich's proposed term to express stereo-chemical relations. The subject of molecular configuration is comparatively new; still we are becoming familiarized with diagrams and models intended to represent such relations. Many of us may have been at first indisposed to accept these views as anything more than visionary and fantastic; but the more we have pondered them, the more have we been impressed with their significance and beauty. Shape, form, and volume must be attributed to molecule as well as to mass; the only trouble has been in regard to the former, the apparent audacity and hopelessness of any attempt to penetrate matter to such depths. The new and most refined sense furnished to us by the use of polarized light, makes us aware of isomers identical in every respect, save their response to this delicate physical agent. Optical isomers have given rise, under the crucial investigations of such men as van t'Hoff, LeBel, Wunderlich, and V. Meyer, to the hypotheses of the asymmetric carbon atom, and the tetrahedral arrangement of the valence-bond, and the saturating atoms or radicals. The simple and symmetrical tetrahedron of methane must be accepted as the perfect analogue of a crystal of the same geometric form; and the optical isomers resulting from the different arrangements of the same atoms or residues around an asymmetric carbon atom, may, in like manner, be taken as the analogues of enantiomorphous crystals, as of quartz, right-handed and left-handed; the pairs in each case being perfectly equivalent, but not superposable.

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NOTES AND NEWS.

THE cause of the terrible disaster at St. Gervais is now being investigated by several men of science. There can be no doubt that it originated in the small glacier called the Tête Rousse, which is nearly 10,000 feet above sea-level. According to a correspondent of the London *Times*, who writes from Lucerne, Professor Duparc is of opinion that the habitual drainage of this glacier had for some reason or other become either totally blocked or obstructed; the water gradually accumulated in its natural concavity or bed; and the ever-increasing volume had exercised such an enormous pressure as to force a passage and carry away a portion of the face of the glacier with it. The mass of ice and water rushed down the rocks which dominate the glacier of Bionnassay, not in a single stream but in several, and then reunited into one enormous torrent at the foot of the Bionnassay glacier. A different theory is held by Professor Forel, of which the correspondent of the *Times* gives the following account: Professor Forel does not see how a quantity of water sufficient to force away so large a portion of the glacier could possibly accumulate in so small a body as the Tête Rousse, which has a total superficies of less than one hundred acres. It slopes freely on three sides; it is, in fact, one of the most abrupt of the whole chain of Mont Blanc; and, in a glacier of this description, with an altitude of nearly 10,000 feet, there are none of the conditions of a great accumulation of water. In his opinion, therefore, we must look for the main cause of the disaster in the natural movement and breaking up of the glacier. He estimates the volume of ice which fell at between one and two million cubic metres. The mass, first in falling and then rushing down the rapid slope, became transformed, for the most part, into what he calls a lava of ice and water. The ravine, he says, through which this avalanche rushed shows no traces of any great evacuation of water; in the upper portions of its transit there is no mud and no accumulation of sand, but, on the other hand, there are great blocks of glacier ice strewn everywhere, and at several points he found portions of powdered ice mixed with earth. Then, again, if this had been simply a torrent of water falling, it would have found its way

down the more violent inclines, instead of, as in this case, passing straight over the frontal moraine at the foot of the glacier. In this higher region, therefore, all the evidence points to an avalanche of ice, which, starting at an altitude of nearly 10,000 feet, and descending at an incline of 70 per cent for 5,000 feet, was pulverized by its fall, a large portion of it being melted by the heat generated in its rapid passage and contact with matters relatively warm. It rushed into the ravine by the side of the glacier of Bionnassay and joined the waters of the torrent which issues therefrom, and, further aided by the stream of Bon Nant, it became sufficiently liquid to travel down the lower portions of the valley at the slighter incline of 10 per cent, and yet retained sufficient consistency to destroy everything in its passage. That this torrent was not composed merely of mud and water is proved, he says, by the fact that it did not always maintain the same height when confined to the narrower ravine, and that the remains on the sides of the rock show it to have been a viscous substance rather than fluid.

— At a meeting of the London Chamber of Commerce on July 25, as we learn from *Nature*, Mr. J. Ferguson read a paper on "The Production and Consumption of Tea, Coffee, Cacao (Cocoa), Cinchona, Cocoa-Nuts and Oil, and Cinnamon, with reference to Tropical Agriculture in Ceylon." He referred to the position of Ceylon, its forcing climate, its command of free cheap labor, and its immunity from the hurricanes which periodically devastated Mauritius, from the cyclones of the Bay of Bengal, and from the volcanic disturbances affecting Java and the Eastern Archipelago. The plantations of Ceylon afforded, he said, the best training in the world for young men in the cultivation and preparation of tropical products, and in the management of free colored labor. The cultivation of cane-sugar, although tried at considerable outlay on several plantations forty and fifty years ago, proved a failure. More recently experiments by European planters with tobacco had not been a success, notwithstanding that the natives grew a good deal of a coarse quality for their own use. Although cotton growing had not been successful, the island had proved a most congenial home for many useful palms, more particularly the coconut (spelt without the *a* to distinguish it and its products from cocoa — the beans of the shrub *Theobroma cacao*) and palmyra, as also the areca and kitul or jaggery palms. Within the past few years Ceylon had come to the front as one of the great tea-producing countries in the world, India and China being the other two, with Java at a respectable distance. Mr. Ferguson said one of the chief objects of his paper was to demonstrate which of the products of the island it was safe to recommend for extended cultivation in new lands, and which were already in danger of being over-produced, and he had arrived at the conclusion that coffee, cacao, and rubber-yielding trees were the products to plant, while tea, cinnamon, cardamoms, cinchona bark, pepper, and even palms (for their oil) did not offer encouragement to extended cultivation. Statistics relating to the total production and consumption were given in an appendix.

— A third edition, largely rewritten, of "The Microscope and Histology," by Simon Henry Gage, associate professor of physiology in Cornell University, has been issued by Andrews & Church, Ithaca, N. Y. This volume contains much useful information, systematically arranged, and will, no doubt, be appreciated by those who are learning to use the microscope and desire to familiarize themselves with the most approved microscopical methods. Chapter I. relates to "The Microscope and its Parts;" Chapter II. to "The Interpretation of Appearances," which will be of special value to beginners; Chapter III. gives detailed information with reference to "Magnification, Micrometry, and Drawing;" Chapter IV. treats of "The Micro-Spectroscope and Micro-Polariscope;" Chapter V. of "Slides, Cover-glasses, Mounting, Labelling," etc.

— B. Westermann & Co. will publish in September the third volume of Conway and Crouse's translation of Karl Brugmann's "Comparative Grammar of the Indo-Germanic Languages." The fourth and concluding volume, with a full index, will be issued next year.

SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

PUBLISHED BY

N. D. C. HODGES,

874 BROADWAY, NEW YORK.

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Great Britain and Europe..... 4.50 a year.

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CURRENT NOTES ON ANTHROPOLOGY. — XII.

[Edited by D. G. Brinton, M.D., LL.D.]

Ligurians, Iberians, and Siculi.

PROFESSOR G. SERGI occupies the chair of anthropology in the University at Rome, and Professor G. Niccolucci that in the University of Naples; but these two scientists of eminence are far from agreeing as to the ethnic position of the Ligurians, or as to the shape of their skulls. Professor Niccolucci described some alleged Ligurian crania, which seemed to show them to have been a round-headed people, and hence, the Professor inferred, of "Turanian" origin. But Professor Sergi insists that the said skulls were only those of modern Modenese, and neither ancient nor Ligurian. His own authentic series of Ligurian skulls proves them, on the contrary, to have been long-headed, with narrow noses, orthognathic, and with no similarity to Turanians; but with a very close likeness to the ancient Iberian type, such as the brothers Siret exhumed from the neolithic deposits of southern Spain. What is more, in two series of neolithic skulls from southern Sicily he proves that identically the same peculiarities recur; so that the ancient Siculi and Secani who held that region before the Greeks came, he believes to be branches of one stock, and both of them out-posts of that same Ligurian people who in proto-historic times occupied most of the coast of the Mediterranean Sea, from the Straits of Gibraltar to the tip-end of the Italian peninsula. For him, Siculi, Sicani, Ligures, Iberi, as ancient ethnic names, all refer to branches of the same stock; and the cave men of Mentone and the Arene Candide in Italy, and of Cro Magnon in France, alike furnish us with specimens of the Ligurian cranial form. His interesting essay is in the *Bulletino di Paleontologia Italiana*, December, 1891.

The Meaning of Ethnography.

In the first number of a new journal, *Bibliothèque de l'Alliance Scientifique*, Tome I., Fasc. I., appears what we should call a "symposium" on the meaning and the objects of Ethnography. The writers are Jules Oppert, Claude Ber-

nard, Jomard, A. Castaing, Leon de Rosny, Jules Simon, D. Marceron, and other well-known names.

One perceives in most of their contributions that confusion of terms which is so prevalent in France, and which is so severely and justly criticised by Topinard in his last work, "L'Homme dans la Nature," pp. 7, 8, 23, 24, etc. By its derivation and according to its early and correct usage, ethnography means a description of the actual condition of a people or peoples. So it was employed by Niebuhr and Campe early in the century, and so it is used to-day by Gerland, Ratzel, and the other leading ethnographers outside of France; and so it should be in France. A word common to science should connote the same ideas everywhere.

Jomard defines it as "the science whose final purpose is to explain the progress of humanity." C. A. Pret gives us the terse sentence, "Ethnography is the social history of humanity." Another contributor puts it, "Ethnography seeks to define the laws of the moral and intellectual evolution of man." Carnot studies it, "to discover a solid foundation for my political faith;" de Rosny, "for the new lights it casts on the grand and enigmatical problem of destiny."

These are brave words, and they tell us a great deal about the meaning and purpose of ethnology, but are wholly misapplied with regard to the term ethnography in its correct sense, either in French or English. They illustrate the need of a correct nomenclature in this science.

The Primitive History of Mankind.

A volume on this subject which is at once scientific and popular is a decided benefit to the study of anthropology; and such a one we have in Dr. Moritz Hoernes's "Die Urgeschichte des Menschen nach dem heutigen Stande der Wissenschaft" (Vienna, H. Hartleben, 1892). It is clearly printed and abundantly illustrated, and its scope may be guessed from its size—672 large octavo pages. It takes in the whole of what is now called the "pre-history" of Europe, beginning with the alleged remains of tertiary man and extending down to the time when history proper takes up the thread of the development of the human race in that continent. Several chapters of an introductory character explain the nature and objects of pre-history, and examine into what we may understand by the earliest conditions of culture in the human race.

Dr. Hoernes is not a mere book-maker, as is so often the case with authors of popular scientific works, but is a prominent member of the Anthropological Society of Vienna, and a practical laborer in the vineyard of archæology. He has a right, therefore, to press some of its wine wherewith to treat the general public. May they quaff deeply and become intoxicated with the attractions of this new science, full of promises and full of mysteries!

Early Development of the Art-Faculty.

The development of the art-faculty is as much an ethnic as it is a personal trait. As we find among our own acquaintances some singularly gifted in this respect, and others, of equal or greater general ability, quite devoid of it, so it has been with nations and tribes in all periods of culture. In lower stages of development it is more ethnic than personal, the individual then being less free.

For these reasons the scepticism which has met the discovery of free-hand drawings on horns and bones dating from palæolithic times is not well founded. Those from the caves of La Madeleine in France representing the mammoth

and reindeer are well known; still more remarkable are those from the Kessler hole, near Schaffhausen, in Switzerland. A sketch of a reindeer feeding, now in the Rosgarten Museum, Constance, and one of a horse, in the Schaffhausen Museum, both from this locality, are so true to nature that one is surprised that they could have been drawn by a person not regularly instructed. Yet the draughtsman lived at a time when the Linth glacier covered the site of the present city of Zurich, and the musk-ox and reindeer pastured where now grow the vineyards of the Rhine.

Several curiously inscribed stones and shells have within the last few years been found in the eastern United States, regarded by their owners as the work of aboriginal artists. Two of them represent the mammoth; others, scenes from life, as battles. While not to be rejected at once, grave suspicion attaches to all such for obvious reasons, the first of which is the constant recurrence of frauds in American antiques. There is now no doubt that Professor Wright was deceived in the small terra-cotta image from a great depth in Montana which he described; and it is very easy for an enthusiast to fall into such snares.

An Aboriginal Pile-Structure.

A late issue of the Peabody Museum of Archæology is a report upon pile-structures in Naaman's Creek, near Claymont, Delaware, by Dr. Hilborne T. Cresson. It will be remembered that in *Science*, Vol. XV., p. 116, etc., there was a correspondence on the character of the structure which these pile-remains indicated. The facts as set forth in the pamphlet now published show that at the mouth of Naaman's Creek three groups of pile-butts were discovered, in a line running from north to south across the creek. In the immediate vicinity, at various depths in the mud and gravel, about 700 stone implements were found, some quite rude, of argillite, others highly finished, of jasper, slate, quartz, etc.

As the mouth of the creek where it falls into the river was evidently a favorable camping and fishing ground for the natives, these implements might reasonably have been expected in such a locality. Was their presence in any way related to that of the piles? Dr. Cresson conjectures that the piles originally formed native fish-weirs. It may be so, but a careful study of the plans which he furnishes, and an inspection of the piles themselves at Cambridge, lead me to think they were intended as supports for some structure which rested upon them. Were they the rude piers of some early Swedish bridge across the creek? Were they the abutments of an ancient wharf? Were they the foundations of dwellings? The average size of the groups, about 12 by 6 feet, would answer the requirements of the latter theory; and pile-fittes were by no means unknown among the American aborigines.

MEDICAL BOTANY.

BY CHARLES FREDERICK MILLSPAUGH, M.D.

In looking over the prospectuses of the various medical colleges of the United States, one fails to find in a great majority of them anything to indicate that the important subject of medical botany is taught. One wonders at the apathy of medical institutions in this respect when pausing to consider the fact that seven-tenths of the drugs in general use have a vegetable origin, and an action upon the animal economy analogous to their botanical relationship.

I fully agree with Professor Barnes¹ in his statement that, to the general public (and I am sorry to add, to the average

Board of Instruction as well), the first thought arising to the mind when botany or botanist is mentioned, is a vague picture of "a sort of harmless crank," wandering about fields, woods, and bogs, picking insignificant weeds and carrying them home, principally to tear them in pieces when he gets there. I urge, with the professor, the necessity of modernizing botanical instruction in colleges and normals, and would add to the list pharmaceutical and medical institutions. Examine the text-books on materia medica used in these latter institutions, and what do you find? Simply an alphabetical arrangement of drugs. This does not meet the needs of the subject treated, for a student should be trained to study drugs in accordance with their analogy to other drugs, and not according to their indexial position in a language. In order to do this he must have, not a rudimentary knowledge of botany and vegetable chemistry, but a thorough and systematic attainment of the subject, not only as represented by the flora of the campus and surrounding woods and fields, but of the world at large. Upon opening these actual text-books we shall find atropine, an inflammatory poison, preceded by aspidium, an anthelmintic, and followed by aurantia, a simple carminative, none of these bearing the least rational relation to the others. An index would have found these drugs readily, while their disposal in this manner will teach the student nothing, nor will it in the least assist his memory to retain the uses of them.

Drugs of botanical origin are as closely allied to each other medically as the plants from which they are derived are botanically; therefore in the above illustration atropine should have been preceded by stramonium and followed by hyoscyamus. Again genera and families of plants have true and constant familial and generic drug action, and the individual species of these have idiosyncracies of action peculiar to themselves. To continue the same illustration, belladonna and atropa, with their *atropa-atropine*; stramonium, with its *datura-atropine*; and hyoscyamus, with its *hyoscyamine*; together with other Solanaceæ — to which botanical family they belong — all cause delirium, but its character differs in each drug; they all dilate the pupil, but the expression of the face under the dilation is dissimilar; they all cause spasmodic action, but the spasms are varied; and among other symptoms they all cause an eruption of the skin, but in each case the eruptions may be readily distinguished. This study may be carried through the whole range of the drug action, not only in the family here presented, but through the whole natural plant system as well. This being true, should not the medical student's first training in materia medica be a thorough course in systematic botany?

Pure science in the collegiate study of drugs has of late been set aside for the greater study of the less useful questions of etiology and diagnosis. Of what immediate care to the patient are hours of scientific and exhaustive guesswork as to what caused him to be ill, when he knows that this is followed by but a moment's thought expended upon the more vital question of what drug should be employed to make him well again? Take up the first medical magazine at your hand; in it you will doubtless find a long dissertation upon some case in practice. Column after column will be found to be devoted to the elucidation of points of diagnosis and etiology, and suppositions, perhaps, of bacterial invasion and cell disintegration, then a line or two to therapy, then the post mortem.

Careful, comprehensive, differential, and comparative study of botany and vegetable chemistry in their relation to

¹ *Science*, Vol. XX., page 62.

materia medica must be followed in order to educate a good therapist, and the sooner our medical institutions make a requisite of this branch, the better it will be for patients treated by their graduates.

ON THE PRESENT TENDENCY TOWARDS HIGHER STANDARDS OF PROFESSIONAL EDUCATION.

ONE cannot but observe with pleasure, in the present general advance and spread of higher education, that this advance is affecting not only the institutions of higher learning themselves and the general population, but also the strictly professional or technical schools. And whilst I wish in this short paper to refer more especially to law and medicine, my remarks will apply also to other — perhaps to all other — professions.

The medical education of this country has, deservedly enough, for many years been looked upon with little favor, and has ill stood the test of competition with the methods of other countries; but now we are observing a great change in this respect, and there is no doubt that before many years the degree of M.D. from an American university will be as valuable a certificate on its face as can anywhere be obtained. Medical courses of four years' duration are now being adopted, or have already been adopted, by the leading medical schools in the country. The requirements in preliminary education have also greatly increased, and one may hope that before long such subjects as botany and zoology may be added to the requirements of a good English and general education from the intending student of medicine. State legislation itself has not been idle, and we find in the State of New York, for example, that no person can practise medicine without undergoing an examination conducted by the State Board of Examiners. A requirement of preliminary education has also been added, and though as yet no more than an elementary education is required, we may hope for better things in future.

As regards the profession of law, the advance is perhaps even more marked; more marked, that is, as regards legal education, for we do not find that the advance in the requirements for admission to the bar has been so considerable as might be desired, though they have been by no means neglected. Three-year law-school courses, which not so long since were unheard of, have now become the rule rather than the exception; and even in those schools which still see fit to maintain a two-years' course for the degree of bachelor of laws, a graduate course has been commonly added. Towards the general extension of the study of law so as to include the Roman or Civil Law, the tendency is by no means general, caused no doubt by the non-requirement of this branch for admission to the legal profession. Some universities, indeed, in their college courses, offer instruction in this subject; but it must be remembered that the majority of law-students are not college graduates, and so the breadth of their legal knowledge will be measured by the instruction given in the law school, however the depth and extent of what subjects they do touch upon may be increased afterwards. Yale is, I believe, alone among the universities in this country which gives extended courses in the civil law, and encourages their study by the bestowal of a degree (that of D.C.L.); but even then the course is one taken by but few students, and, as the catalogue says, is intended for those who intend to be something more than practising lawyers. This is not as it should be, and we must look to the future for more general study of this subject, for without it

law can hardly be taught as a science, for law is — and should be known as — a science.

Education preliminary to the study of law has also risen greatly. Latin is now a usual requirement, and we may doubtless soon see it a universal one.

The day is not far distant then, let us hope, when the title Doctor or Lawyer will in itself mean an educated man.
N. H.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

The Elm-Leaf Beetle. *Galeruca xanthomelæna* Schr.

IN *Science*, No. 492, for July 8, 1892, Dr. C. V. Riley records the facts, that at Washington, D.C., the imagos from the first brood of larvæ of the above insect had already appeared, and that eggs from beetles of this summer brood had been obtained June 28. In a letter dated July 27, Dr. Riley informs me that from these eggs larvæ had been obtained and that these larvæ were then pupating. Dr. Riley's observations are positive, and prove

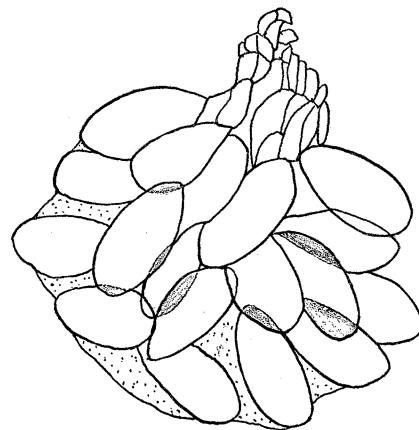


FIG. 1.

that there are two broods at least of this insect at Washington, D.C. They prove also that the beetles will mate and oviposit readily in confinement, and that there is only a brief interval between the appearance of the beetles and oviposition for the second brood of larvæ. This means that the beetles of both sexes are sexually mature when they emerge from the pupæ, or that they mature very rapidly and copulate within a very brief period after assuming the imaginal form. The accuracy of these observations I do not question; but neither do I admit that I am in error in claiming that in New Jersey, north of New Brunswick, there is only a single brood of this insect.

My acquaintance with the beetle at New Brunswick began in 1889, in which year I protected the large number of elms in and near the college campus and about the Experiment Station by spraying with a London purple mixture. In the Report of the College Experiment Station for 1888, Dr. George D. Hulst, my predecessor in office, had stated that there were two broods of the insect annually; and on the appearance of the summer brood of beetles, I made ready to spray again as soon as the second brood of larvæ should begin to appear on the protected trees. They never did make their appearance, and I was unable to find a second brood on any other trees in the city. Dr. Hulst, in response to questions, informed me that he had noticed only one brood of larvæ in 1888; but there had been a cyclonic storm about the time they became mature, which freed the trees and covered the ground beneath them with thousands of the slugs, only a few of which ever found their way back to their food.

To this destruction he attributed the absence of the second brood which published accounts led him to expect. I recorded these facts in my Report for 1889, claiming positively that there was a single brood only at New Brunswick. My observations, carefully repeated in 1890 and 1891, simply confirmed this conclusion.

These observations were presented at a meeting of the Entomological Club of the A. A. S., and, though he could not gainsay my facts, Dr. Riley yet doubted the correctness of my conclusion, as his paper in *Science* also shows. I therefore resolved to repeat my work yet more carefully in 1892 and to make it conclusive if

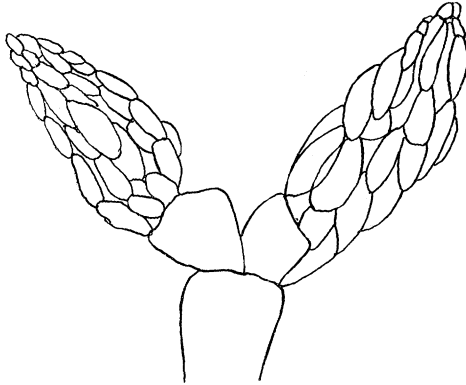


FIG. 2.

possible. The first signs of the beetles were noticed on May 17, in the form of small round holes eaten in a few leaves; on the 19th a few of the beetles were seen, and after that date they increased rapidly in numbers for some time. The weather for a few days was cold and wet, the insects were sluggish, and no eggs were observed until May 29. For special observation I selected a small tree between my home and the laboratory, which I passed several times daily, could see all parts of easily, and which was a prime favorite with the insects.

Eggs began hatching June 6, while yet oviposition continued. After the middle of the month the hibernating beetles diminished in number, and on the 30th not a beetle could be found. June 29 the first pupæ were formed and larvæ matured daily thereafter



FIG. 3.

in greater abundance. At this date a very few unhatched egg-clusters were yet to be found, but of those collected, only one mass gave larvæ July 1. Since that date and up to date of writing (Aug. 1), there has not been a cluster of eggs on any tree that I have examined, and I have closely scanned many dozens, large and small. Early in July I gathered in over 200 pupæ and mature larvæ under the observed tree, and placed them in breeding-cages and jars. Adults began to appear July 8, and very rapidly thereafter in the open air as well as in my cages. It is interesting to note that on June 29, when I secured the first pupa, Dr. Riley

already had eggs of a second brood. The beetles bred by me fed readily and abundantly for nearly three weeks, and then more slowly, until at this time they refuse to feed entirely. During all this time there has not been a copulation nor an egg-mass in any jar, nor have I observed a copulation or an egg-mass in the open air. On July 30 I observed a disposition on the part of my insects to refuse food and to hide among the dry leaves. I therefore selected a considerable number of them of both sexes for examination. In all, the sexual structures were immature or undeveloped. In the male it was difficult to get the testes, because they were mere empty thread-like tubes. In the females the ovaries were mere bundles of tubes without even partially-developed eggs. I gathered rather more than forty specimens from the trees, and found the same state of affairs, except that in one specimen the ova had begun to develop. This morning I selected a few fresh and fat specimens—all females, as it proved—and though the abdomen was much distended, the distension was caused by the fully-dilated crop and stomach, and the ovaries were yet less developed than in any previously examined. Soon after the beetles appeared in May, I examined a number of them and found that in all the sexual structures were fully matured. In the males the testes were quite rigid coils, which were easily removed entire, while in the females the ovaries so completely filled the abdominal cavity that it was impossible to open it without detaching or crushing some of the eggs. The beetles earliest matured are now seeking winter quarters.

I consider my observations, now carried on for four years in succession, as conclusive of the fact that at New Brunswick, N.J., there is only a single brood of this species annually. I present herewith figures of part of one ovary (Fig. 1) of a beetle taken May 25, in which the oviduct and part of the developed eggs are removed; of the ovaries of a beetle taken July 30 on the trees, in which they were best developed of all those examined (Fig. 2); and of the ovaries of a specimen three weeks old (Fig. 3), with which all the others that were examined agreed in that they were at least no more developed. All the figures were made by the use of a camera with a Zentmayer binocular stand, 2-inch objective, a eye-piece, and drawing-board six inches from camera. The vagina is not shown in Fig. 3, but is as large as that shown at the base of Fig. 2, and this is the only structure that has the full size. I have not considered it necessary to figure the male organs, though the difference between spring and summer beetles is equally striking. In none that I examined did I find anything like a developed testicle.

JOHN B. SMITH, Sc.D.

Rutgers College, Aug. 1.

Wheat Rust and Smut.

As a general rule the Bulletins issued from the various State Agricultural Experiment Stations, while not notable for the amount of original matter they contain, are fairly accurate in their statements, and their recommendations are to be relied upon. Occasionally errors creep in, some of them the result of haste in compilation, others the result of not being conversant with the latest information on the subjects discussed. In the former category must be placed the statement made in Bulletin No. 83 of the Michigan Agricultural Experiment Station that wheat rust can be successfully treated by what is known as the Jensen hot-water method; that is, immersing the seed in water having a temperature between 132° and 135° F. Wheat rust has been long under investigation. It has caused a loss of about £2,000,000 sterling annually in Australia, and it is safe to say that there is not a country or a State where wheat is grown that has not suffered from its ravages. The fact is that while wheat *rust* is described and illustrated in the Bulletin in question, the treatment for prevention of wheat *smut* is given. It is needless to say that what is applicable to one is not to the other. Farmers who expect to prevent wheat rust by the hot-water treatment will be sorely disappointed. Perhaps their disappointment will result in making them question, without cause, however, the benefits to be derived from treating for smut. Between the two diseases there is a vast difference; one (*rust*) attacks the leaves, the other (*smut*) attacks the grain. In the latter case treatment of seed will be

beneficial. In the former it will do no good whatever. This is mainly because in the former infection takes place probably by means of spores disseminated by the wind, so that whole fields soon become infected. It cannot be denied that an effectual remedy for wheat rust is still a great desideratum.

JOSEPH F. JAMES.

Washington, D. C., Aug. 5.

The Ancient Libyan Alphabet.

IN *Science*, July 15, Dr. Brinton has some remarks on this subject, which I have read with surprise. The old Libyan alphabet, he says, "appears to have been in common use among the Berber tribes of north Africa long before the foundation of Carthage (1), . . . and in its forms is almost entirely independent of the Phœnician letters (2). It is composed of consonants called *tifinar* (3), and vowel-points, known as *tidebakin*. The latter are simple dots (4), the former are the lines of a rectangle, more or less complete (5). Several of them are found in the oldest Etruscan inscriptions (6). . . . The writers who have given especial attention to this little-known subject are Faidherbe, Duveyrier, Halévy, Bissuel, and, recently, Dr. Collignon (7)."

To avoid repetition, and facilitate reference, I have numbered the points in this passage on which I should like to offer a few observations.

1 and 2. What authority has Dr. Brinton for referring this alphabet to pre-Carthagenian times, and for stating that its forms are almost entirely non-Phœnician? I have hitherto regarded the Punic origin of the Libyan letters as an established fact accepted by all epigraphists of weight, and notably by Mommsen, who unhesitatingly recognizes their Semitic descent: "The Libyan or Numidian alphabet now as formerly in use amongst the Berbers in writing their non-Semitic language is one of the innumerable offshoots of the primitive Aramæan type. In some of its details it seems even to approach that type more closely than does the Phœnician itself. We are not, however, therefore to conclude that the Libyans received it from immigrants older than the Phœnicians. It is here as in Italy, where certain obviously more archaic forms do not prevent the local alphabet from being referred to Greek types. All that can be inferred is that the Libyan alphabet belongs to the Phœnician writing older than the epoch when were composed the Phœnician inscriptions that have survived to our time" (*History of Rome*, iii., 1).

It follows that the Numidian ancestors of the Berbers received their writing system from the Carthaginians, earliest Phœnician settlers on the north African sea-board, and, consequently, that the Libyan alphabet had no currency "long before the foundation of Carthage." The archaic forms referred to by Mommsen were the forms in use in Tyre and Sidon in pre-historic times, whereas the extant Phœnician inscriptions date from historic times; hence the discrepancies between the latter and those preserved by the Berbers, most conservative of all peoples.

3. Not the consonants alone, but the whole system (mainly, of course, consonantal as being Semitic) is called "tifinar," or rather "tiffinagh." The sounds *gh* and *rh* interchange in the Libyan dialects (*Ghet* and *Rhet*; *Melghigh* and *Melrhurh*, etc.), so that it is not always easy to decide which is the original sound. But here there is no doubt that *gh* is organic; and Barth, for instance, always writes *Tefnagh*, plural *Tefnaghen*: "There was in particular a man of the name of Sâma, who was very friendly with me. On reading with him some writing in *Tefnaghen*, or the native Berber character, I became aware that this word signifies nothing more than tokens or alphabet. For as soon as the people beheld my books, and observed that they all consisted of letters, they exclaimed repeatedly, 'Tefnaghen — ay — Tefnaghen!'" (*Travels*, V., p. 116). There is, however, more in this word than Barth was aware of. When stripped of the common Berber prefix *te*, it reveals the "Finagh," i.e., "Phœnician," or "Punic" origin of the letters in their very name. Note the stress still falling on the root *fin*, as in *Pœni*.

4. F. W. Newman explains *Tidebákka* (pl. *Tidebákken*) to mean "a dot on or under the letter" (*Vocab.*), in fact any diacritical mark of the kind, and not merely vowel signs. Some, however,

are doubtless used to voice the consonants, as in Hebrew. Like other Semitic alphabets, Tefnagh had originally no vowels, but only three breathings, transformed in some systems (Greek, Italic) to pure vowels, in others (Cufic, Arabic) to semi-vowels and vocalic bases. But all this merely tends to strengthen the view that the Libyan is a Semitic alphabet.

5. This statement is to me unintelligible. In the published Libyan alphabets (Fr. Ballhorn, "Alphabete orientalischer und occidentalischer Sprachen," p. 8; Hanoteau, "Essai de grammaire de la langue tamachek," and others) curves occur quite as frequently as straight lines, while acute decidedly prevail over right-angles. Of the eight letters copied by Barth (l., p. 274) two only can be described as "more or less complete rectangles," forms which are certainly less common than, for instance, in Hebrew and Estranghelo.

6. It would be strange if resemblances did not occur between the Libyan and the characters of "the oldest Etruscan inscriptions," seeing that both have a common Semitic origin, the former directly through the Phœnician, the latter indirectly through the archaic Greek. But such resemblances obviously lend no color to Dr. Brinton's peculiar views regarding Libyco-Etruscan linguistic affinities.

7. Of the writers here referred to, Faidherbe and Halévy alone can be regarded as specialists. On the other hand, there are serious omissions, such as Dr. Oudney, who in 1822 first discovered the existence of the Berber alphabet; F. W. Newman, "Patriarch of Berber philology;" Mommsen and Hanoteau, as above; lastly, A. Judas, who was the first to clearly establish the Phœnician origin of these characters in a paper entitled "De l'écriture libyco-berber," contributed to the *Revue Archéologique* for September 1862.

A. H. KEANE.

Broadhurst Gardens, London, N.W.

BOOK-REVIEWS.

Handbook for the Department of Geology in the U. S. National Museum. Part I. Geognosy.—The Materials of the Earth's Crust. By GEORGE P. MERRILL. Washington, Government Printing Office, 1892. 89 p. 12 pl.

THE U. S. National Museum is probably the greatest institution of its kind in this country. The museums located in New York, Cambridge, Boston, Philadelphia, and other large cities present to the residents of those places and to students many facilities for study. This is particularly the case with the American Museum of Natural History in New York and the Museum of Comparative Zoology in Cambridge. But neither one of these has been planned upon so extensive a scale, or is destined to attain such mammoth proportions, as the National Museum at Washington. The country at large is familiar with some things to be found at the museum from the numerous expositions at which displays of its treasures have been made; but no one who has not visited and lingered long in its great but crowded quarters at the National Capital can adequately realize the broad foundation upon which it is based, or the immense variety and scope of its collections. There are gathered together here materials which cover all human arts and all the natural sciences—anthropology in its widest sense, from the rude, chipped-flint implement of palæolithic man to the delicate *Sevres* china of civilized man; rocks and fossils from the most ancient formations to the most recent; animal forms from the minutest insect that flies to the hugest creature of land or sea. Scarcely an object, indeed, in which man has had aught to do, or to find interest in, but is to be found here.

The collections are not, either, lying idle. A large corps of curators is constantly at work, either arranging the old collections or studying and comparing the new. The results of these studies appear from time to time in the *Proceedings of the Museum*—a publication scarcely known to the public at large even by title, on account of its limited circulation—or else in the *Annual Reports of the Museum*, which are more widely known from being distributed as congressional documents. Unfortunately, these last usually appear from two to three years after the date they are stated to be reports for.

In the early days, when the Smithsonian Institution was the

repository for the national collections, these reports touched but lightly upon the vast amount of material stored away. Within the past five years, however, and since the National Museum has become recognized as the place where all government expeditions shall deposit the material collected by them, a large volume has been annually devoted to this branch alone. Those which have been issued are filled with information upon a great variety of subjects, although special attention seems to have been devoted to ethnology. Naturally, other matters are treated of, and it is likely that, in the future, place will be given to all departments as fast as the several curators find time or see fit to devote their attention to making the collections under their charge known to the outside world.

The article under review, for it is merely an excerpt issued under a separate cover from the Report of the Museum for 1890, and covering pages 503-591 of that report, is one which, while designed to be a handbook for the collections, is in reality a condensed account of the rocks forming the earth's crust. In it one will find concise descriptions of the sixteen principal elements that go to make up rock masses; a list of the original and secondary minerals of these rocks; an account of the macroscopic and microscopic structure of rocks; the chemical composition (in brief) and the color. The most extensive portion of the handbook, however, is that which deals with the kinds of rocks. Under this head we have described the four varieties of (1) *aqueous*, those formed through the agency of water either as chemical precipitates or as sediments; (2) *æolian*, those formed from wind-drifted materials; (3) *metamorphic*, those changed by dynamical or chemical agents from an original aqueous or igneous origin; and (4) *igneous* (eruptive), those brought up from beneath the surface in a molten condition. It is not necessary to go into details as to all these classes, or to mention the various divisions made of them; an extract or two will serve to show the character of the remarks. For example, under Chlorides we read:—

"Sodium chloride, or common salt, is one of the most common constituents of the earth's crust. From an economic standpoint it is also a most important constituent. It occurs in greater or less abundance in all natural waters, and, as a product of evaporation of ancient seas and lakes, it occurs in beds of varying extent and thickness among rocks of all ages wherever suitable circumstances have existed for their formation and preservation. Salt-beds from upwards of a few inches to thirty feet in thickness occur in New York State and Canada, while others abound in Pennsylvania, Virginia, Ohio, Michigan, and Louisiana. There are also numerous surface deposits, of great extent, in the arid regions of the West" (p. 533).

Under the head of *Siliceous group*, infusorial or diatomaceous earth, we find the following:—

"This is a fine white or pulverulent rock composed mainly of the minute shells, or tests, of diatoms, and often so soft and friable as to crumble readily between the thumb and finger. It occurs in beds which, when compared with other rocks of the earth's crust, are of comparatively insignificant proportions, but which are nevertheless of considerable geological importance. Though deposits of this material are still forming, e.g., in the marshes of Yellowstone Park, and have been formed in times past at various periods of the earth's history, they appear most abundantly associated with rocks belonging to the Tertiary formations.

"The celebrated Bohemian deposit is some fourteen feet in thickness, and is estimated by Ehrenberg to contain 40,000,000 shells to every cubic inch. The Australian specimen exhibited is from a deposit four feet in thickness. In the United States, beds are known at Lake Umbagog, New Hampshire; Morris County, New Jersey; near Richmond, Virginia; Calvert and Charles Counties, Maryland; in New Mexico; Graham County, Arizona; Nevada; California; and Oregon. The New Jersey deposit covers about three acres, and varies from one to three feet in thickness; the Richmond bed extends from Herring Bay, on the Chesapeake, to Petersburg, Virginia, and is in some places 30 feet in thickness; the New Mexico deposit is some six feet in thickness and has been traced some 1,500 feet; Professor LeConte states that near Monterey, in California, is a bed some 50 feet in thickness; while the geologists of the fortieth-parallel survey report beds not less than

300 feet in thickness of a pure white, palebuff, or canary-yellow color as occurring near Hunter's Station, west of Reno, Nevada.

"The earth is used mainly as a polishing powder, and is sometimes designated as *tripolite*. It has also been used to some extent to mix with nitro-glycerine in the manufacture of dynamite. Chemically the rock is impure opal" (p. 540).

It is in such books as these that the young student finds his best helps. The information given is accurate; the paths are made pleasant; the rough places are smoothed. It is greatly to be desired that the other departments of the Museum may have as useful descriptions of their contents.

JOSEPH F. JAMES.

Washington, D.C., Aug. 8.

Phases of Animal Life, Past and Present. By R. LYDEKKER. London. Longmans, Green & Co. 8°. \$1.50.

THIS admirable series of essays, which was originally published in *Knowledge*, has been reprinted in an attractive form both as regards typography and illustrations. The essays are concisely written, and reveal a wealth of knowledge on the part of the author. The explanations of scientific discoveries and conclusions are neither too elementary nor too technical, and the essays will be read with pleasure as well as profit by anyone interested in zoological lore.

The earlier and the closing chapters of the book are devoted to the consideration of various morphological adaptations, such as protective armor, the modifications of limbs for flying and swimming, and the forms of teeth and horns. The author then takes up the fossil reptiles, describing the characteristics of the ichthyosaurs, plesiosaurs, and dinosaurs, and explaining the differences between them. Other chapters relate to the tortoises, the extinct gigantic birds, the egg-laying and marsupial mammals, and other animals whose structure and history are of special interest. There is for the most part no close connection between the various topics, but they are all important and worthy of attention.

In the treatment of morphological subjects Mr. Lydekker makes use of certain metaphorical expressions which may possibly mislead the unwary reader. Various modifications are spoken of as if they resulted from the conscious, intelligent action of the animals concerned. It is stated, for example, that the ancient mail-clad fishes "appear to have come to the same conclusion as the more advanced divisions of the human race, that a massive armor for the protection of the body is an encumbrance" (p. 7). Again, the reptiles "held divided opinions as to whether a bony coat of mail was or was not a thing to be retained as a permanency." Such expressions are calculated to induce a wrong way of looking at things unless, indeed, the Lamarckian idea that modifications result directly from the efforts of organisms is to be accepted.

One is surprised to find in the writings of so good a naturalist as Mr. Lydekker the statement, or insinuation, that the separation of the amphibians from the reptiles is due to "that tendency to multiply terms for which they (the naturalists) are so celebrated" (p. 8). Mr. Lydekker, of course, well knows and, indeed, takes pains to explain, that the separation was made on account of the fact that the typical representatives, at least, of these two groups are very different both in structure and mode of development. There have undoubtedly been many instances in which naturalists have coined new names unnecessarily, but this is certainly not a case in point.

These are small defects, however, and are entirely overbalanced by the excellencies of the book. It deserves and will repay perusal.

AMONG THE PUBLISHERS.

"THE Delaware Indian as an Artist" is the subject of a fully illustrated paper by Dr. Charles C. Abbott, to appear in *The Popular Science Monthly* for September. The objects of art which are represented include carved-stone gorgets, a wooden spoon-handle, wooden masks, and other carvings, many of them showing much skill. Professor J. S. Kingsley will describe "The Marine Biological Laboratory at Wood's Holl," giving pictures of its building and interior arrangements. Something is told also of its neighbor, the laboratory of the United States Fish Commission. Surgeon George M. Sternberg, U.S.A., will have a paper on "In-

fectious Diseases: Causation and Immunity," giving the facts that have been established in this field up to date; and "A Further Study of Involuntary Movements," by Professor Joseph Jastrow, supplementing a previous paper on this subject, will appear.

— Charles Scribner's Sons issued on Aug. 8 Stevenson's long-expected book on Samoa, entitled "A Footnote to History," being a narrative of the varied history of that island for the past eight years.

— J. B. Lippincott Company's August Bulletin of New Publications contains, among other announcements, the following: "Photography: Its History, Processes, Apparatus, and Materials. Comprising Working Details of all the more Important Methods," by A. Brothers. In the preparation of this work, the author's aim has been to produce a Handbook for the Use of Students of Photography, which should give the results of practical experience, and include — as far as possible within a moderate compass — information gathered from many sources, and not readily accessible. The newer methods have been dealt with in sufficient detail, and special attention given to the processes in use prior to the introduction of the gelatino-bromide method. Some of these processes are in danger of being neglected through the facilities which the newer methods have introduced. But, as Professor Brothers demonstrates, the new processes do not give results equal to the old, and are totally unsuitable for some purposes — such as making negatives for photo-lithography, and in various other ways. Where practicable, the plates illustrate the processes described,

thus making the work distinctly more serviceable to students. "In Starry Realms: a New Work on Astronomy," by Robert S. Ball; "Regional Anatomy in its Relation to Medicine and Surgery," by George McClellan, M.D.; "Steam Boilers: their Defects, Management, and Construction," by R. D. Monro. Of books in press, "A Short Course on Zoology Designed for High Schools and Academies," by C. De Montmahon and H. Beauregard; translated and adapted for American schools by Wm. H. Greene, M.D. "Recent Rambles, or in Touch with Nature," by Charles C. Abbott, M.D.

— Ginn & Co. have nearly ready "German Orthography and Phonology," by George Hempl, Assistant Professor of English in Michigan University. They will publish in the fall "Fourier's Series, and Spherical, Cylindrical, and Ellipsoidal Harmonics," with applications to problems in mathematical physics, by W. E. Byerly.

— *Outing* for August opens with the first instalment of Wheelman Frank G. Lenz's description of a cycling tour around the world. The rider is at present somewhere on the broad western plains, en route for the Pacific coast, and during his two-year jaunt he will traverse Japan, China, India, Persia, Turkey, Austria, Germany, Holland, France, England, Scotland, and Ireland. Mr. Lenz will communicate his experiences to *Outing* from convenient points of his journey, illustrating his articles by photographs taken by himself. The opening chapter describes the trip

Publications Received at Editor's Office.

- APGAR, AUSTIN C. Trees of the Northern United States. New York, American Book Co. 12°. 224 p. \$1.
- ARKANSAS GEOL. SURVEY. Annual Report for 1890. Little Rock, Press Print. 8°. 474 p.
- BEAN, TARLETON H. Notes on Fishes Collected in Mexico. Washington, Government. 8°. Paper. Ill.
- BENEDICT, JAMES E. Crustoid Crabs of the Genera Telmessus and Erismacrus. Washington, Government. 8°. Paper. Ill.
- BOLLES, T. DIX. Chinese Relics in Alaska. Washington, Government. 8°. Paper. Ill.
- EIGENMANN, CARL H. The Fishes of San Diego. Washington, Government. 8°. Paper.
- HOFFMAN, B. B. The Sloyd System of Wood Working. New York, American Book Co. 12°. 242 p. \$1.
- JEFFERSON, SAMUEL. Columbus. An Epic Poem. Chicago, S. C. Griggs & Co. 12°. 239 p.
- LINTON, EDWIN. Notes on Avian Entozoa. Washington, Government. 8°. Paper. Ill.
- MASON, ORIS T. The Ulu, or Woman's Knife of the Eskimo. Washington, Government. 8°. Paper. Ill.
- RATHBURN, MARY J. Catalogue of Crabs of the Family Pericruidæ. Washington, Government. 8°. Paper.
- RICKOFF, REBECCA D. A Supplementary First Reader. New York, American Book Co. 12°. 122 p. 25 cts.
- SHUFFELDT, R. W. The Evolution of House Building among the Navajo Indians. Washington, Government. 8°. Paper. Ill.
- SHUFFELDT, R. W. A Maid of Wolpai. Washington, Government. 8°. Paper.
- SMITH, JOHN B. Revision of the Genus Cuculla, etc. Washington, Government. 8°. Paper. 86 p.
- STYNEGER, LEONHARD. Preliminary Description of a new Genus and Species of Blind Cave Salamander. Washington, Government. 8°. Paper. Ill.
- STYNEGER, LEONHARD. Notes on a Collection of Birds made in Japan. Washington, Government. 8°. Paper.
- WILLIAMSON, MRS. M. BURTON. An Annotated List of the Shells of San Pedro Bay. Washington, Government. 8°. Paper. Ill.

Reading Matter Notices.

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For exchange.—Three copies of "American State Papers Bearing on Sunday Legislation," 1891, \$2.50, new and unused, for "The Sabbath," by Harmon Kingsbury, 1840; "The Sabbath," by A. A. Phelps, 1842; "History of the Institution of the Sabbath Day, Its Uses and Abuses," by W. L. Fisher, 1839; "Humorous Phases of the Law," by Irving Browne; or other works amounting to value of books exchanged, on the question of governmental legislation in regard to restriction of personal liberty, etc. If preferred, I will sell "American State Papers," and buy other books on the subject. WILLIAM ADISON BLAKELY, Chicago, Ill.

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—The experiment station of Cornell University conducted an experiment in 1890, showing very decided beneficial results from removing the tassels from a part of the growing corn; their calculations showing about fifty per cent gain from the rows from which the tassels were removed over the alternate rows on which the tassels were allowed to remain. This remarkable showing caused a similar experiment to be undertaken at the Ohio station in 1891. Thirty-two rows of corn, running over quite uniform land, were selected upon which to make this trial. On Aug. 1, the tassels were pulled from each alternate row. At cutting-time four rows, having the tassels removed, were cut and shocked together, then four rows from which the tassels were not removed were shocked together. Continuing this throughout the thirty-two rows, they had when done four shock rows of each. When husked these shock rows were weighed separately. They also

separated the merchantable from the unmerchantable corn, and calculated the yield of each separately per acre. They find that the unmerchantable corn from the four plots from which the tassels were removed averages 26 per cent, while the averages from the other four rows is 21 per cent unmerchantable. The calculations also show that the average yield per acre is about one bushel less than where the corn was left undisturbed. It is probable that the tassels were not removed in this experiment early enough. To insure or even make possible beneficial results from removing tassels, the pulling should be done as soon as they appear, and before the stalk has weakened itself in an attempt to perfect the tassel. The theory upon which this experiment is based is that the strength that would otherwise go to the maturing of the tassel and production of pollen is diverted to the use of grains, and from their more complete development more corn is produced. The fodder in this experiment was not weighed, because back-water from a high river damaged it to such an extent as to make the weight unreliable.

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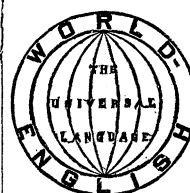
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PUBLISHER'S ANNOUNCEMENT.

Titles of Some Articles Published in *Science* since
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